

Automated Oxygen Level and Temperature Monitoring System with RFID Attendance

Ashish M Kshirsagar, Shreyas D Bhawe, Shubham P Thakur, Prof. Sharad Jagtap, Prof. Ashlesha Adsul

Department of Electronics and Telecommunication

Savitribai Phule Pune University APCOER,

Pune, MH, India

Abstract- The main motive of this project is to reduce the spread of COVID -19, to do the same we need eliminate the human interference for monitoring the temperature and oxygen levels of people while entering any social places like offices. This is where our project helps, with the use of Raspberry Pi processor and the Oxygen and temperature sensors like MAX30100 and MLX90614 respectively we can automate the whole process. The Oxygen Sensor (MAX30100) we can get body oxygen level and then the sensor will provide the data to the processor. Same with the Temperature Sensor (MLX90614) this sensor will detect the body temperature without any physical contact and provide data to sensor. The processor will study the data and if the data fits in normal human body reference values the person will be allowed inside. Then with the help of RFID we register data and attendance of the employee in databases.

Keywords: Automation, IOT, MAX30100, MLX90614, RFID RC522

Introduction

Due to the outbreak of COVID-19 the world stopped, and everybody was forced to stay at home avoid social places like offices, schools, and colleges. But the things are changing now, with help of Vaccination and social distancing and rules forced by the government the spread of COVID-19 is control now and now we are going back to normal in life while following some rules for our goods. The main objective to this project is to reduce the spread of COVID -19, to do the same we need to eliminate the human interference for monitoring the temperature and oxygen levels of people while entering any social places like offices.

This is where our project helps, with the use of Raspberry Pi processor and the Oxygen and temperature sensors like MAX30100 and MLX90614 respectively we can automate the whole process. The Oxygen Sensor (MAX30100) we can get body oxygen level and then the sensor will provide the data to the processor. Same with the Temperature Sensor (MLX90614) this

sensor will detect the body temperature without any physical contact and provide data to processor. The processor will study the data and if the data fits in normal human body reference values the person will be allowed inside .Also, with the help of web application we can easily monitor employee attendance as well as health (body temperature and blood oxygen level).

By using or applying this automated system we can monitor the health of the employee and also maintain the attendance of the specific employee. Also this automation helps to reduce spread of Covid-19 infection by reducing human involvement. There are huge chances of Covid-19 infection spreading while taking the Sanitizer through the dispenser or while the security staff checking Oxygen level and Temperature of that employee. Which will result in large spread of infection and we might again face lockdown. So, the only way left is to, we need to automate the whole process and reduce the human involvement. So, to do the whole process automated we need to take help of processors like Raspberry Pi 3b+ and Oxygen (MAX30100) and Temperature (MLX90614) sensors. By which we can record and monitor the vital stats of the employee. Scope of study is that in this Covid-19 situation we are going to make this system fully automated.

Methodology

Our purposed methodology includes Raspberry Pi with Oxygen sensor, Contactless Temperature sensor, IR sensor and RFID Reader. The IR sensor can be used in sanitizer dispenser which will automate the dispenser and dispense the sanitizer without any physical contact and for further process. The employee with RFID card will tap ID card on RFID reader for Identification Now the employee need to place his finger on the Oxygen sensor which will read the pulse and body oxygen level and show the details on display and the processor will record it. After the Oxygen level the employee needs bring his hand near the IR temperature sensor which will sense the body temperature and show it on display and the processor will record the same. And if the Oxygen level and Body temperature is in normal limits the person will be allowed in by automatic door opening. Also, all the data monitored and stored in cloud and can be seen and monitored with the help of Web Application.

Limitations of study

Contactless oxygen monitoring is not possible due to lack of research because there is no compact contactless oxygen monitoring system available in the market which will give accuracy up to 95%

Area of the study

The study has been conducted on the basis of Covid-19 spreading in our society.

Sources of Data

This study is based on data which have been obtained from annual reports of the News, Papers, Social platform and websites.

Tools Used:

-) Raspberry pi 3b+
-) IR Sensors
-) Oxygen Level Sensor (MAX30100/30102)
-) Temperature Level Sensor (MLX90614)
-) RFID Sensor
-) Sanitizer dispenser
-) Raspbian OS
-) Thonny Python

Specifications of Sensors

MAX30100:

The MAX30100 operates from 1.8V and 3.3V power supplies.

Integrated LEDs, Photo Sensor, and High-Performance Analog Front –End.

Tiny 5.6mm x 2.8mm x 1.2mm 14-Pin Optically Enhanced System-in-Package

MLX90614:

Supply Voltage/ Accuracy - 5V - 3V.

Factory calibrated in wide temperature range: -40 to 125 °C for sensor temperature and -70 to 380 °C for object temperature.

RC522:

Operating frequency: 13.56MHz.

Supply Voltage: 3.3V. Current: 13-26mA.

Read Range: Approx. 3cm with high frequency card.

Literature Review

Design of low-flow oxygen monitor and control system for respiration and SpO2 rates optimization, this paper was published in the year 2020 at IOP Conf. Series: Journal of Physics and we understood the how to measure the temperature level automatically and manually of the specific person with the help of MLX90614 and how to measure the Oxygen saturation or SpO2 monitoring with help of sensor MAX30100.

RFID Based Attendance System using IOT, this paper was published in the year 2020 at International Journal of Modern Science and Technology and we understood how we can note on record the data of the person by using the RFID system in which the RFID card and RFID reader is used and also how to display the data on the LCD screen and how to store the data into the database.

Sensor-Based Automatic Hand Sanitizer Dispenser, this paper was published in the year 2021 at Medical Journal of Dr. D.Y. Patil Vidyapeeth and we understood how to build a sanitizer dispenser with help of the relay module, diodes, water pump which is fully a automated system.

Working

Our project includes Raspberry Pi with Oxygen sensor, Contactless Temperature sensor, IR sensor and RFID card and reader.

The IR sensor can be used in sanitizer dispenser which will automate the dispenser and dispense the sanitizer without any physical contact.

Then the same will give the signal to processor that the person has sanitized himself and now ready for RFID attendance system. The registered person can place their card on the RFID reader which will read the data and mark the attendance of the employee by sending the data to processor and the same data can be also used to maintain the oxygen and temperature details of the employee.

Now the employee need place his finger on the Oxygen sensor which will read the pulse and body oxygen level and show the details on TFT display and the processor will record it.

After the Oxygen level the employee needs bring his hand near the IR temperature sensor which will sense the body temperature and show it on TFT display and the processor will record the same.

And if the Oxygen level and Body temperature is in normal limits the person will be allowed in by automatic door opening. If not then the employee not be allowed in but the reason is stored in database

Block Diagram

Raspberry Pi: The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

RFID: Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader

Temperature Sensor (MLX90614): The MLX90614 is an infrared thermometer for non-contact temperature measurements.

Oxygen Sensor (MAX30100): The MAX30100 is an integrated pulse oximetry and heart-rate monitor sensor solution. It combines two LEDs, a photo detector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart rate signals.

IR Sensor: An infrared sensor (IR sensor) is a radiation-sensitive optoelectronic component with a spectral sensitivity in the infrared wavelength range 780 nm -50 μm. IR sensors are now widely used

in motion detectors, which are used in building services to switch on

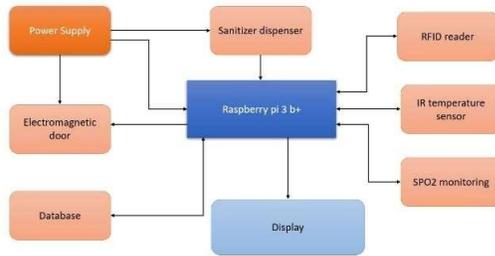


Fig 1. Block Diagram

Flowchart

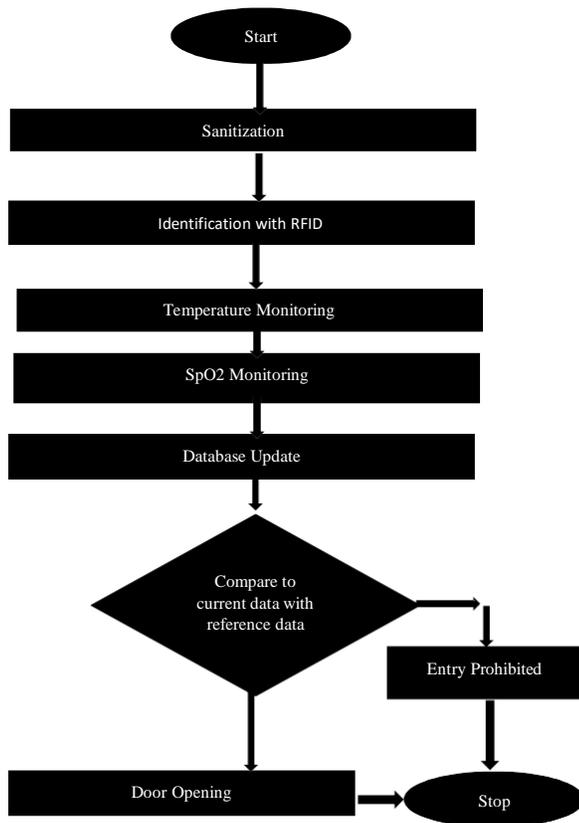


Fig 2. Flowchart

Conclusion

The Project will maintain the employee daily data of attendance, body temperature and oxygen level. The system will not allow the employee having COVID symptoms like fever or low oxygen level. There will be no human interference so the infection will not spread, and the data maintained will be proper and error free.

Acknowledgment

We have took efforts in this project. However, it would not be workable without the kind support of our guide Mr. Sharad Jagtap sir and Ashlesha Adsul ma'am. We would like to extend our thanks to him for his support.

Reference

Monitoring heart rate and SpO2 using Thingsboard IoT platform for mother and child preventive healthcare, T M Kadarina1 and R Priambodo2, IOP Conf. Ser.: Mater. Sci. Eng. 453 012028

Design of low-flow oxygen monitor and control system for respiration and SpO2 rates optimization, Ayu Jati Puspitasari, Deshinta Famella, M Sulthonur Ridwan and M Khoiri, IOP Conf. Series: Journal of Physics: Conf. Series 1436 (2020) 012042

Design of a contactless body temperature measurement system using Arduino, Asif Ahmed and Mohd Noor Abdullah, September 2020 Indonesian Journal of Electrical Engineering and Computer Science 19(3):1251

Temperature Measurement using Infrared Contactless Thermal Gun, Mukul Madhukar Diwanji; Saurabh Mukund Hisvankar; Chhaya Sunil Khandelwal, 2020 International Conference on Smart Innovations in Design, Environment, Management, Planning and Computing (ICSIDEMPC)

Non-contact Infrared Temperature Acquisition System based on Internet of Things for Laboratory Activities Monitoring, Gonçalo Marques* and Rui Pitarma, The 9th International Conference on Sustainable Energy Information Technology (SEIT) August 19-21, 2019, Halifax, Canada

Biometric-Based Attendance Tracking System for Education Sectors: A Literature Survey on Hardware Requirements, Seng Chun Hoo1 and Haidi Ibrahim, School of Electrical & Electronic Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, Malaysia, Volume 2019 |Article ID 7410478 | <https://doi.org/10.1155/2019/7410478>

Biometric Attendance System, Engr Imran, Imran Anwar Ujan, Ali Imdad, International Conference on Complex Medical Engineering At: Harbin, China Volume: Proceedings of the 20 11 IEEEICME

Sensor-based automatic hand sanitizer dispenser, Vaibhav Rajendra Suryawanshi, Hiral Chatur Surani, Hariram Ramashray Yadav, Research Scholar, Bachelor of Pharmacy, Proceedings of the 20 20 IEEEICME